

# Latest updates on the CalLite Model Development

Nazrul Islam, Ph.D., P.E.  
Bay-Delta Office



February 23, 2009



## Outline

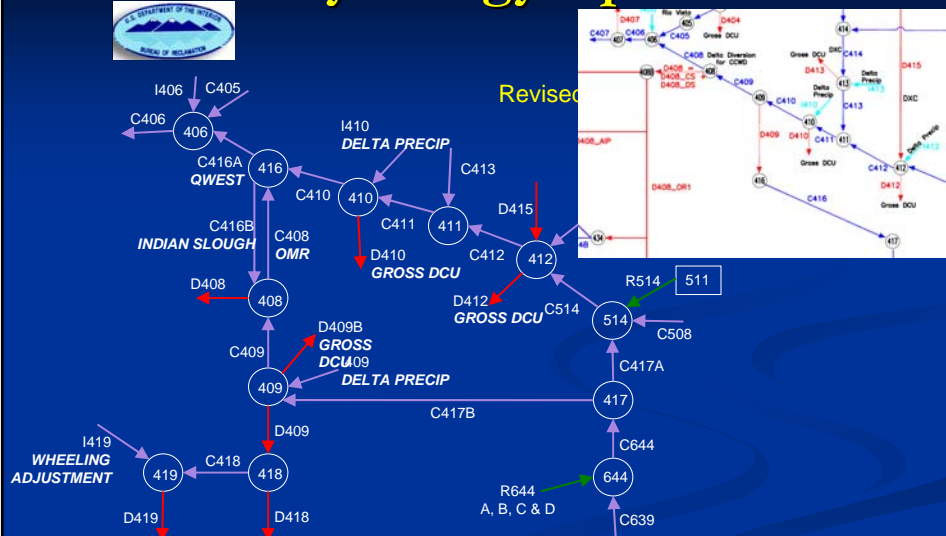
- Callite (Version 1.10) Model updates
  - Update hydrology
  - New X2 calculation option
  - Sea Level Rise Options
  - Climate Change Options
  - Revised and New Water Management Actions
  - Allocation Procedures
- Limitations and known issues
- Future updates



- # Hydrology Updates



- # Hydrology Updates



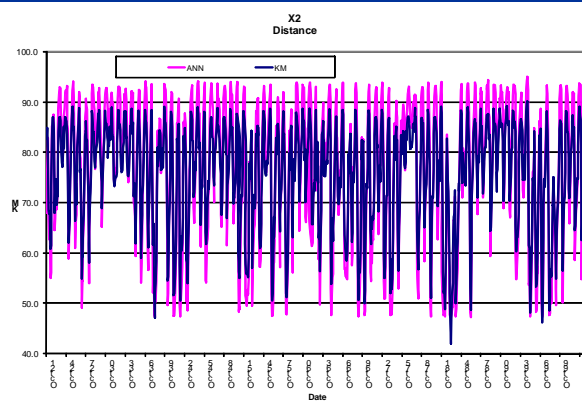
Notes: R644E removed and  
nodes 416 and 417 redefined



## ANN procedure for X2

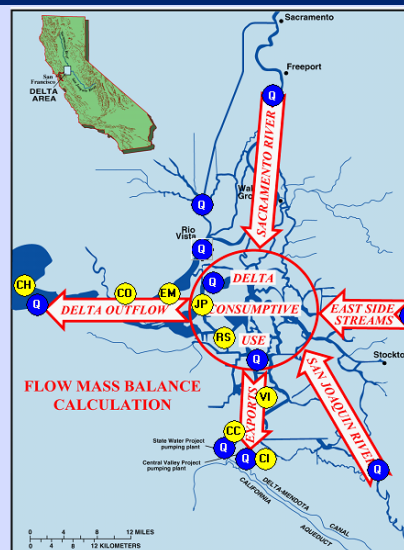
- New ANN to calculate X2

■ Base (Current Sea Level) / ANN X2  
■ Base (Current Sea Level) / KM X2



## ANN EC output locations

Detailed Delta



■ Flow information

■ Salinity information

JP = Jersey Point  
EM = Emmonson  
CH = Chipps Island  
CC = CCFB Intake  
RS = Rock Slough  
CO = Collinsville  
VI = Victoria Intake  
CI = CVP Intake



# ANN procedure for X2

## HydroClimate Dashboard

Central Valley Water Management Screening Model - Hydroclimate

Hydroclimate  
Central Valley Water Management Screening Model

MAIN MENU

- MAIN HOME
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  - Operations
- SCHEMATIC
- RESULTS
- INSTRUCTIONS

LEVEL OF DEVELOPMENT

- ☐ Year 2005 Level
- ☒ Year 2030 Level

SEA LEVEL RISE OPTIONS

- ☐ Sea Level Rise 2 ft / ANN X2
- ☐ Sea Level Rise 1 ft / ANN X2
- ☒ Base (Current Sea Level) / ANN X2
- ☐ Base (Current Sea Level) / KM X2

CLIMATE PROJECTION PERIOD

- ☒ Historical Hydrology
- ☐ Mid-Century (2030-2059)
- ☐ End-of-Century (2070-2099)

CLIMATE CHANGE SCENARIOS

- Select One from A2 and B1
  - ☐ A2 Run (6 Realizations)
  - ☐ B1 Run (6 Realizations)
  - ☐ A2+B1 Run (12 Realizations)

PID Set "Probabilistic" when the simulation are in realization mode. Otherwise "Deterministic" mode.

IPCC4 AOGCM Model	ES
<input type="checkbox"/> NIES-MIROC3_2-MED	B1
<input type="checkbox"/> NCAR:CCSM3	
<input type="checkbox"/> MPIM:ECHAM5	
<input type="checkbox"/> NCAR:PCM	
<input type="checkbox"/> GFDL:CM2_1	
<input type="checkbox"/> CNRM:CM3	A2
<input type="checkbox"/> NIES-MIROC3_2-MED	
<input type="checkbox"/> NCAR:CCSM3	
<input type="checkbox"/> MPIM:ECHAM5	
<input type="checkbox"/> NCAR:PCM	
<input type="checkbox"/> GFDL:CM2_1	
<input type="checkbox"/> CNRM:CM3	

Simulation Run Controller

START: 00-05-01

END: 00-05-01

RESULTS

OCT-01-2003 00:00:00



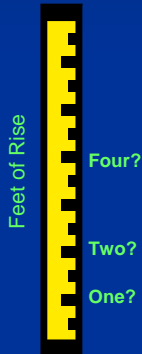
# Sea Level Rise (SLR) options

## SEA LEVEL RISE OPTIONS

- ☐ Sea Level Rise 2 ft / ANN X2
- ☐ Sea Level Rise 1 ft / ANN X2
- ☒ Base (Current Sea Level) / ANN X2
- ☐ Base (Current Sea Level) / KM X2



## Sea Level Rise

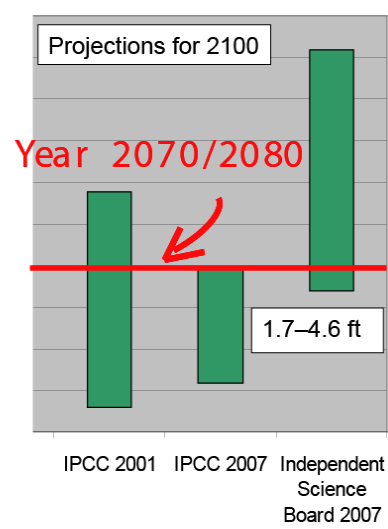
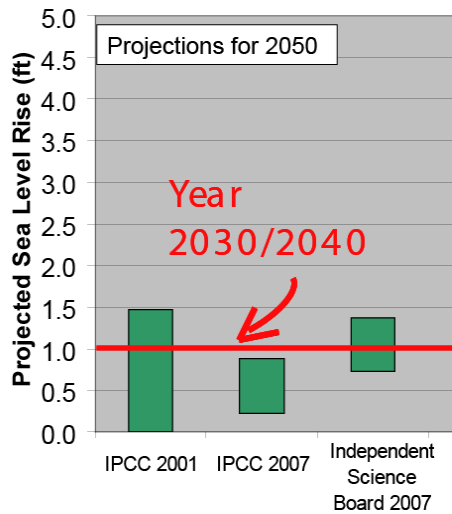


Increasing threat of

- salinity intrusion
- flood
- levee failure
- inundation
- habitat changes/loss



## Sea Level Rise





## Sea Level Rise

### Model Assumptions:

LOD 2030 Hydrology  
Future Demands  
Existing Facilities  
D1641 Regulations



## Sea Level Rise

### Salinity Changes at Export Locations:

Alternatives	CCFB Intake		CVP Intake	
	(Aug-Jan)	(Feb-July)	(Aug-Jan)	(Feb-July)
1 ft Mean sea level rise	23%	8%	20%	7%
2 ft Mean sea level rise	53%	20%	45%	16%



## Sea Level Rise

### South of Delta Exports : 1 ft Sea Level Rise

Periods	Exports		
	Base	change	%change
1928-1934	3553	-117	-3.30%
1976-1977	3598	-59	-1.60%
1986-1992	3941	-305	-7.70%
1922-1993	5939	-130	-2.20%



## Sea Level Rise

### South of Delta Exports : 2 ft Sea Level Rise

Periods	Exports		
	Base	change	%change
1928-1934	3553	-489	-13.80%
1976-1977	3598	-341	-9.50%
1986-1992	3941	-647	-16.42%
1922-1993	5939	-472	-7.90%



# Sea Level Rise

- the impacts of sea level rise in terms of salt water intrusion are greater during August through January.
- For the 2ft sea level rise scenario additional water has to be introduced to avoid cut during drought periods.



# Climate Changes Scenarios





# Climate Change Scenarios

Central Valley Water Management Screening Model - Hydroclimate

Hydroclimate  
Central Valley Water Management Screening I

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CNRM:CM3  
A2



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NCAR:CCSM3  
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CNRM:CM3  
A2

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CNRM:CM3  
B1  
NIES:MIROC3\_2-MED  
NCAR:CCSM3  
MPIM:ECHAM5  
NCAR:PCM  
GFDL:CM2\_1  
CNRM:CM3  
A2



## Climate Change Scenarios

- 6 AOGCM Models
- 2 Emission Scenarios
- 2 Future Projection Periods



24 Climate  
Change  
Scenarios

More at Climate Action Team Report



## Climate Change Scenarios

### AOGCM Models

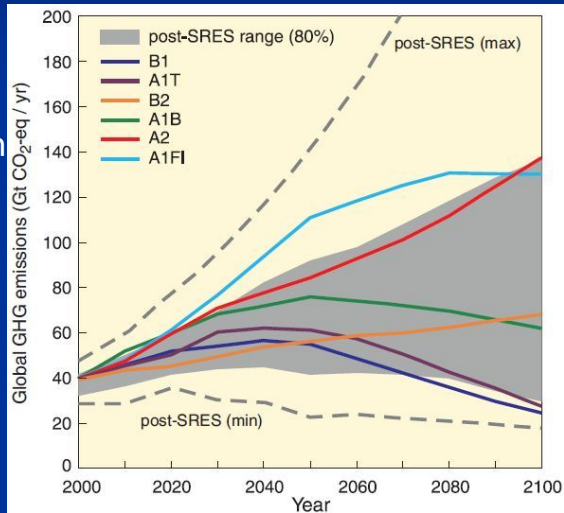
No.	MODEL NAME	SPONSOR COUNTRY
1	CNRM-CM3	France
2	GFDL-CM2.1	USA
3	NCAR-PCM1	USA
4	MPI-ECHAM5	Germany
5	NCAR-CCSM3	USA
6	MIROC3.2-MED	JAPAN



## Climate Change Scenarios

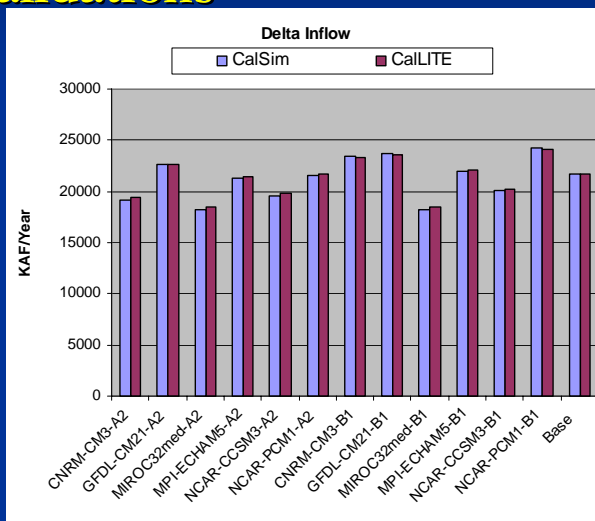
### SRES Emission Scenarios

A2 – High Emission  
B1 – Low Emission



## Climate Change Scenarios

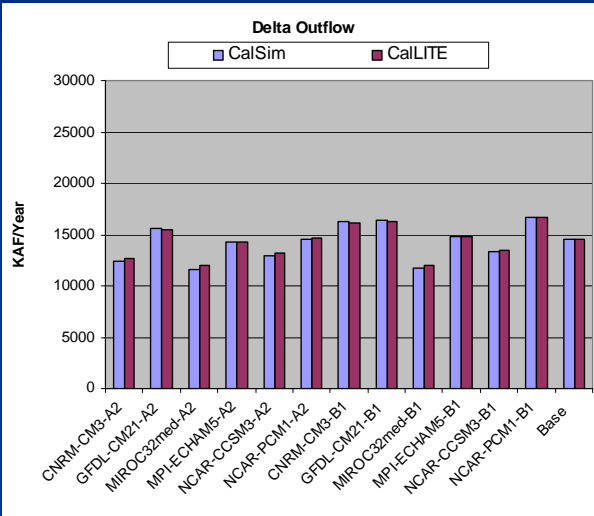
### Model Validations





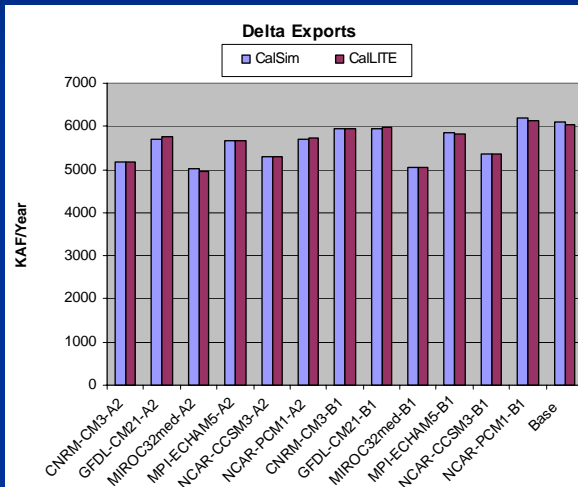
# Climate Change Scenarios

## Model Validations



# Climate Change Scenarios

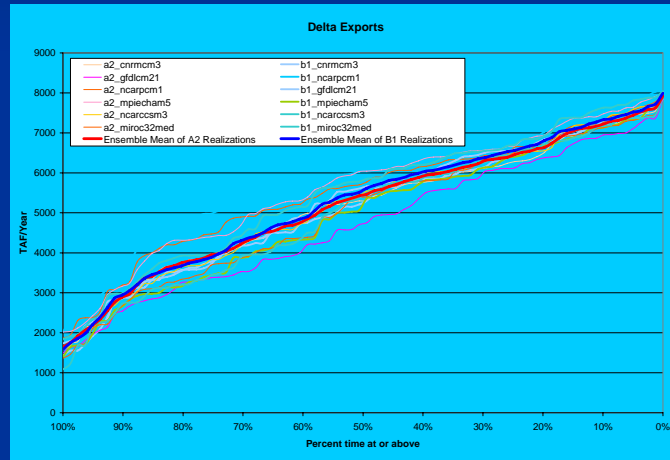
## Model Validations





# Climate Change Scenarios

## Delta Outflow of Multiple Realizations (Mid-Century)



# Water Management Actions

Central Valley Water Management Screening Model - Facilities

Facility Options

Central Valley Water Management Screening Model

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STORAGE FACILITY OPTIONS	ON/OFF	ASSUMPTIONS
North of Delta Offstream Storage	<input type="checkbox"/>	<a href="#">Assumptions</a>
Shasta Enlargement	<input type="checkbox"/>	<a href="#">Assumptions</a>
Los Vaqueros Enlargement	<input type="checkbox"/>	<a href="#">Assumptions</a>
Temperance Flat	<input checked="" type="checkbox"/>	<a href="#">Assumptions</a>
Sacramento Valley Conjunctive Use	<input type="checkbox"/>	<a href="#">Assumptions</a>
CONVEYANCE FACILITY OPTIONS	ON/OFF	ASSUMPTIONS
Isolated Facility	<input type="checkbox"/>	<a href="#">Assumptions</a>
Banks Pumping Plant	<input type="checkbox"/>	<a href="#">Assumptions</a>
HABITAT RESTORATION OPTIONS	ON/OFF	ASSUMPTIONS
Fremont Weir-Yolo Bypass	<input type="checkbox"/>	<a href="#">Assumptions</a>
DWSC East Bypass	<input type="checkbox"/>	<a href="#">Assumptions</a>
Stone Lakes Bypass	<input type="checkbox"/>	<a href="#">Assumptions</a>



# Delta Regulations

Central Valley Water Management Screening Model - Delta Requirements

Sacramento Valley and Delta Environmental Requirements

Central Valley Water Management Screening Model

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PARAMETER

PARAMETER	ON/OFF	If ON, select criteria: Per D1641	User-defined
<b>Interior Delta Flows</b>			
QWEST (San Joaquin River near Jersey Point)	<input type="checkbox"/>		<a href="#">Specifications</a>
Old and Middle River (OMR)	<input type="checkbox"/>		<a href="#">Specifications</a>
Delta Cross Channel	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<a href="#">Specifications</a>
<b>River flows</b>			
Sacramento River at Rio Vista Minimum Flow	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<a href="#">Specifications</a>
San Joaquin River at Vernalis	<input type="checkbox"/>	<input type="checkbox"/>	<a href="#">Specifications</a>
<b>Delta Outflows</b>			
Minimum Net Delta Outflow	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<a href="#">Specifications</a>
X2 Requirements	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<a href="#">Specifications</a>
<b>Exports restrictions</b>			
Export-Inflow Ratio	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<a href="#">Specifications</a>
Vernalis (Vernalis D-1641 Criteria)	<input checked="" type="checkbox"/>		<a href="#">Specifications</a>
Export-San Joaquin River Inflow Ratio	<input type="checkbox"/>		<a href="#">Specifications</a>
<b>Salinity</b>			
Agricultural standards	Emmerton <input checked="" type="checkbox"/>		
	Jersey Point <input checked="" type="checkbox"/>		
	Rock Slough <input checked="" type="checkbox"/>		
Municipal & Industrial standards	Collinsville <input checked="" type="checkbox"/>		
Fish & Wildlife standards			



# Allocation Procedure Options

Central Valley Water Management Screening Model - Dashboard

Operations-Delivery Allocation Procedure

Central Valley Water Management Screening Model

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Allocation Methods:

1) Water Supply Index - Delivery Index (WS/DI) Curve:  
Default option in the model.

2) Forecast Allocation Model (Choose any or both projects):  
Forecast Allocation Model - SWP ☐  
Forecast Allocation Model - CVP ☐  
Forecast model(s) will search for an optimal allocation percentage unless a user defined allocation is desired. Select below check box for fixed allocation(s) for active Forecast model(s):  
Fixed Allocation ☐  
If fixed allocation is preferred, enter user-defined allocations to boxes below:  
CVP\_System  SWP   
CVP\_SOD

3) User-defined Delivery Target:  
User-defined delivery targets ☐ [Modify Time Series](#)



## User Input Summary

Central Valley Water Management Screening Model - Run Settings

Simulation Settings  
Central Valley Water Management Screening Model

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**SIMULATION SETTINGS**

Simulation Period  
Specify start and end time within the range of water year 1922 to 2003

Deterministic vs Probabilistic  
Select probabilistic when simulating climate change scenarios

**SCENARIO SETTINGS**

Clear Scenario History Results  
Open excel scenario files, press desired "Clear Scenario" button on spreadsheet

Clear Scenario Input Summary

1 2 3 4 5  
☒ ☐ ☐ ☐ ☐ Check boxes to view saved scenario results

Save Results as Scenario No. 1



## Model User Guide

### CalLite Central Valley Water Management Screening Model (Version 1.10R)

#### User's Guide

February 2009



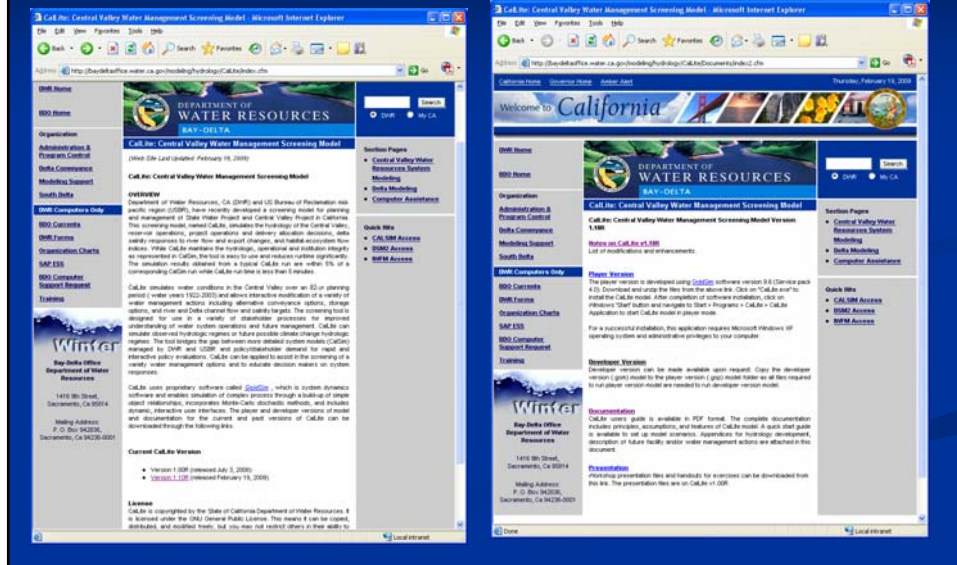
California Department of Water Resources  
and



United States Bureau of Reclamation



## CalLite Website



## Limitation and Known issue

- Issues with Windows Vista
- Excel files have issues with Excel 2007
- Current ANN DLLs have issues with lower thru Delta export with IF scenario
- More improvement is needed for Storage option under Water Management Actions



## Future work

- Migrating CalLite from GoldSim v9.60 to v10.0
- Migrating spreadsheets from Excel 2003 to 2007
- Training a new ANN DLL for IF
- Refining storage options under Water Management Actions
- Developing San Joaquin River module for CalLite
- Developing a programmer's guide

# Thank You

